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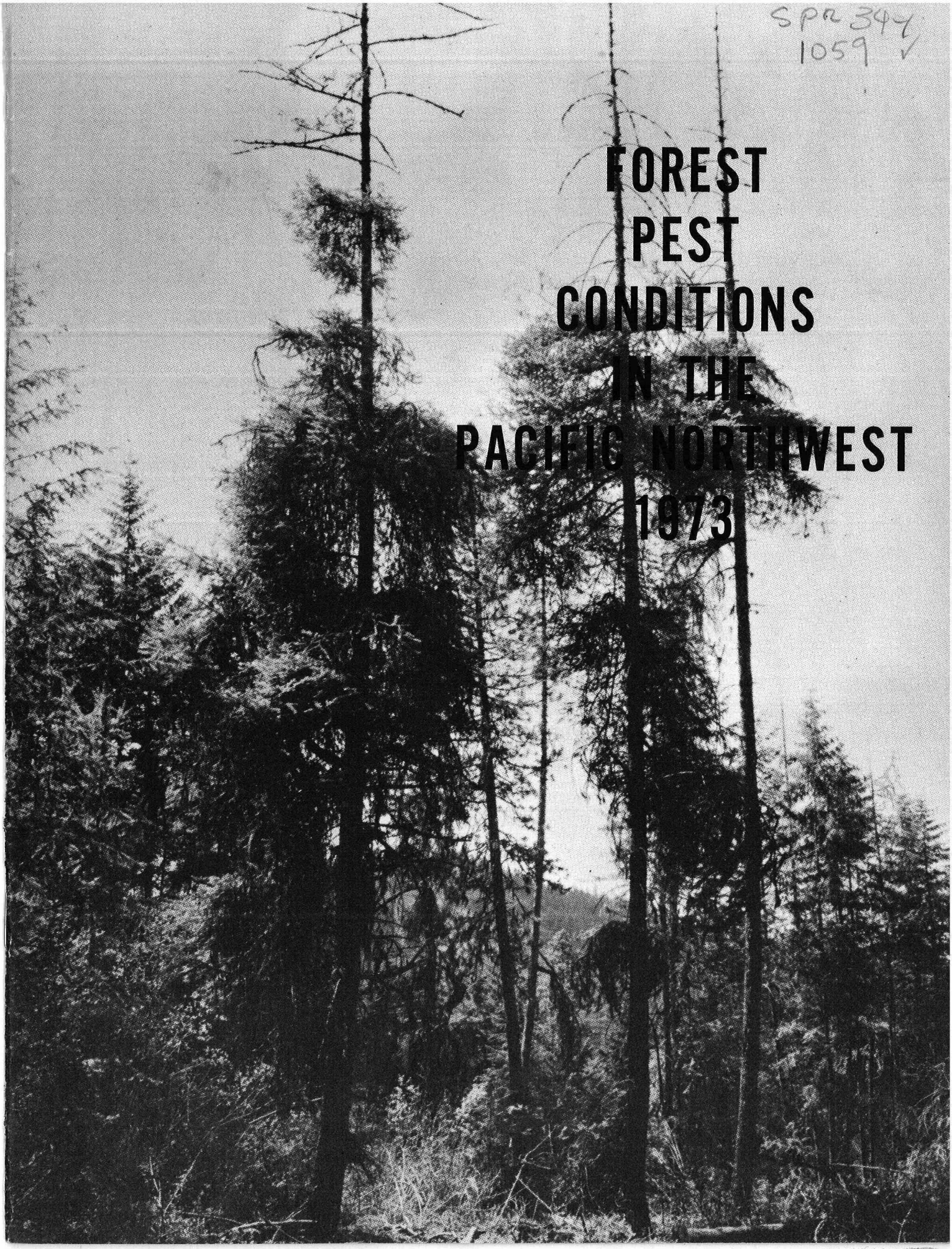

FOREST PEST CONDITIONS IN THE PACIFIC NORTHWEST 1973

This is the 26th annual report of forest pest conditions in Oregon and Washington based on cooperative surveys sponsored by the Northwest Forest Pest Action Council. The combined efforts of many organizations and individuals made these surveys possible. Special acknowledgment is made to the principal cooperators, Oregon State Department of Forestry and Washington State Department of Natural Resources.

COVER BACKGROUND: Douglas-fir trees with top-kill and witches' brooms caused by the Douglas-fir dwarf mistletoe, *Arceuthobium douglasii* Engelmann.

FOREST PEST CONDITIONS IN THE PACIFIC NORTHWEST

1973

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and

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March 1974

INSECT AND DISEASE CONTROL BRANCH
DIVISION OF TIMBER MANAGEMENT
PACIFIC NORTHWEST REGION
FOREST SERVICE
U.S. DEPARTMENT OF AGRICULTURE

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INTRODUCTION

Forest pest infestations were detected and recorded by aerial and ground surveys in cooperation with the Washington State Department of Natural Resources and the Oregon State Department of Forestry. Ground surveys were made to verify aerial survey observations, detect and monitor low level populations, evaluate conditions and trends, and to establish control needs and boundaries.

Volume losses were estimated for all bark beetles, except for the pine engraver. Volumes were estimated from counts of beetle-killed trees made during the aerial surveys. Volume losses to other forest pests were not estimated.

The extent of forest insect outbreaks in Oregon and Washington is summarized in Table 1. Bark beetle infestations are summarized by volume losses and land ownership and classification in Table 2. Other infestations are summarized in Table 3 by land ownership and classification. Diseases are not summarized in tabular form.

CONDITIONS IN BRIEF

Defoliators were the most destructive insects in the Pacific Northwest forests during 1973. The Douglas-fir tussock moth alone caused havoc on 689,760 acres of Douglas-fir and true fir in Oregon and Washington. The western spruce budworm has also been an important defoliator this past year. In Washington and Oregon the budworm caused visible defoliation on 330,340 acres of Douglas-fir and true fir. Isolated populations of the black-headed budworm continue to cause minor defoliation of western hemlock in Washington.

Bark beetles remained active in the Pacific Northwest forests in 1973. The mountain pine beetle continued to cause serious losses in lodgepole pine stands of eastern Oregon and in western white pine stands in the Cascade Mountains of both States. The western pine beetle losses in ponderosa pine stands in Oregon increased. There was a general decline in the Douglas-fir bark beetle activity. Losses were light and scattered over both Oregon and Washington.

Root diseases continue to be a major cause of losses in the Pacific Northwest. Root rots caused serious losses to timber stands, while damping-off fungi caused significant losses in forest nurseries. Needle casts of Scotch pine affected Christmas tree plantations in Oregon and Washington. The Dutch lem disease has been detected for the first time in the State of Oregon.

Table 1.—Summary of forest insect infestations in Oregon and Washington during 1972 and 1973
(In acres)

Insects[1]	Oregon		Washington		Regional Total	
	1972	1973	1972	1973	1972	1973
Bark beetles:						
Douglas-fir beetle (westside)	12,500	8,210	11,850	11,570	24,350	19,780
Douglas-fir beetle (eastside)	41,280	3,480	25,460	4,090	66,740	7,570
Spruce beetle	1,990	140	7,040	9,450	9,030	9,590
Fir engraver	45,320	14,670	3,820	13,490	49,140	28,160
Mountain pine beetle (L)	273,670	233,240	2,960	2,490	276,630	235,730
Mountain pine beetle (S)	470	160	0	0	470	160
Mountain pine beetle (P)	27,010	24,990	1,410	5,800	28,420	30,790
Mountain pine beetle (W)	40,600	14,160	42,400	61,810	83,000	75,970
Pine engraver	17,740	16,380	540	190	18,280	16,570
Western pine beetle	124,800	47,060	240	1,850	125,040	48,910
Silver fir beetles	0	0	7,330	11,670	7,330	11,670
All bark beetles	585,380	362,490	103,050	122,410	688,430	484,900
Defoliators:						
Sawflies on knobcone pine	360	1,560	0	0	360	1,560
Sawflies on western larch	0	1,220	0	0	0	1,220
Western spruce budworm	23,030	48,210	202,470	282,130	225,500	330,340
Modoc budworm	5,810	20,840	0	0	5,810	20,840
Douglas-fir tussock moth	117,890	423,570	78,160	248,760	196,050	672,330
Pandora moth	3,880	0	0	0	3,880	0
Black-headed budworm	0	0	84,800	97,590	84,800	97,590
All defoliators	150,970	495,400	365,430	628,480	516,400	1,123,880
Sucking insects:						
Balsam woolly aphid	64,380	107,620	17,680	10,780	82,060	118,400
All sucking insects	64,380	107,620	17,680	10,780	82,060	118,400
All insects	800,730	965,510	486,160	761,670	1,286,890	1,727,180

[1] Mountain pine beetle infestations are separated by tree species: L, lodgepole pine; S, sugar pine; W, western white pine; P, ponderosa pine.

STATUS OF INSECTS

DOUGLAS-FIR BEETLE, *Dendroctonus pseudotsugae* Hopk.

The Douglas-fir beetle killed approximately 7,136,000 board feet of Douglas-fir in Oregon and Washington in 1973. Losses this past year were only about one-third of those reported for 1972. Most of the damage was centered in the Columbia River Gorge of both Oregon and Washington. Storm damage and windthrown timber was minimal during the winter of 1972-1973 and losses are expected to continue to decline for at least the next year.

SPRUCE BEETLE, *Dendroctonus rufipennis* (Kby.)

Tree killing continued in Engelmann spruce stands on the Okanogan National Forest in Washington. Elsewhere in Oregon and Washington, spruce beetle populations have declined. Aerial detection surveys reported widely scattered patches of mortality.

FIR ENGRAVER, *Scolytus ventralis* LeC.

Fir engraver populations continued to decline over the Pacific Northwest. Losses in true firs were light and scattered over most forests of eastern Oregon and Washington. Most of the damage in Oregon occurred on the Ochoco, Umatilla, and Winema National Forests. In Washington, the Mt. Baker, Okanogan, and Wenatchee National Forests received significant damage. Losses are expected to increase in areas of severe tree defoliation by the Douglas-fir tussock moth and the western spruce budworm.

MOUNTAIN PINE BEETLE, *Dendroctonus ponderosae* Hopk.

This pest continued to cause serious losses in lodgepole pine stands of Oregon. Nearly 35.5 million board feet of timber has been killed this past year. More than half of this loss occurred on the Wallowa-Whitman National Forest. In Washington, losses continued to be light. Losses of western white pine continued high throughout the mountainous regions of both States. In Oregon, most white pine losses occurred in the Willamette National Forest. Losses in Washington were heaviest on the Snoqualmie and Wenatchee National Forests. Mountain pine beetle attacks in pole-size ponderosa pine increased slightly in both Oregon and Washington. (See Map on Page 6)

WESTERN PINE BEETLE, *Dendroctonus brevicomis* LeC.

Infestations of the western pine beetle increased in several mature and overmature ponderosa pine stands in Oregon. Most of the losses occurred in central Oregon where over 4 million board feet of ponderosa pine was killed on the Deschutes and Ochoco National Forests. In Washington, the loss was light and tree killing was widely scattered.

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Table 2.—Summary of 1973 infestations in Oregon and Washington for all bark beetle damage excluding pine engraver

Insect[1]	National Forest lands[2]		Forest lands other than National Forest[3]		Dedicated forest lands (Wild areas & National Parks)[4]		All forest lands	
	Area Acres	*Volume MBF*	*Area Acres*	*Volume MBF*	*Area Acres*	*Volume MBF*	*Area Acres*	*Volume MBF*
Oregon:								
Douglas-fir beetle (westside)	4,850	3,074.750	3,360	1,795.460	0	0	8,210	4,870.210
Douglas-fir beetle (eastside)	2,560	218.280	820	34.020	100	11.820	3,480	264.120
Spruce beetle	80	3.200	30	3.750	30	1.250	140	8.200
Fir engraver	7,830	686.820	6,380	462.500	460	49.390	14,670	1,198.710
Mountain pine beetle (L)	194,570	29,391.290	30,340	4,972.610	8,330	1,103.410	233,240	35,467.310
Mountain pine beetle (S)	160	88.000	0	9.5 0	0	0	160	88.000
Mountain pine beetle (P)	13,840	1,109.860	11,150	319.950	0	0	24,990	1,429.810
Mountain pine beetle (W)	6,540	1,562.910	2,580	2,970.350	5,040	48.750	14,160	4,582.010
Western pine beetle	34,290	5,816.440	12,770	1,378.460	0	0	47,060	7,194.900
Oregon total	264,720	41,951.550	67,430	11,937.100	13,960	1,214.620	346,110	55,103.270
Washington:								
Douglas-fir beetle (westside)	7,730	1,097.890	2,740	295.600	1,100	239.870	11,570	1,633.360
Douglas-fir beetle (eastside)	2,810	281.050	1,120	64.600	160	23.650	4,090	369.300
Spruce beetle	1,710	111.750	440	9.500	7,300	527.500	9,450	648.750
Fir engraver	4,430	382.150	1,750	89.500	7,310	484.900	13,490	956.550
Mountain pine beetle (L)	1,520	42.700	630	7.350	340	13.650	2,490	63.700
Mountain pine beetle (P)	200	3.480	5,600	69.220	0	0	5,800	72.700
Mountain pine beetle (W)	43,780	7,193.330	6,680	1,624.050	11,350	1,297.750	61,810	10,115.130
Western pine beetle	700	36.770	1,150	104.100	0	0	1,850	140.870
Silver fir beetles	8,140	1,225.450	400	94.050	3,130	456.500	11,670	1,776.000
Washington total	71,020	10,374.570	20,510	2,357.970	30,690	3,043.820	122,220	15,776.360
Regional total	335,740	52,326.120	87,940	14,295.070	44,650	4,258.440	468,330	70,879.630

[1] Mountain pine beetle infestations are separated by tree species; L, lodgepole pine; W, western white pine; P, ponderosa pine; S, sugar pine.
[2] Excluding Wilderness areas. The volume that will be salvaged depends upon land use classification, accessibility, and other conditions.
[3] Includes all forested lands not within the boundaries of National Forests or National Parks.
[4] Includes only Wilderness areas of the National Forest System and National Parks.

DOUGLAS-FIR TUSSOCK MOTH, *Orgyia pseudotsugata* McD.

Outbreaks of this defoliator continued to infest new acreage. The total infested acreage was 689,760 (see Map on Page 7). In Oregon and Washington during 1973, light to heavy defoliation occurred on 672,490 acres as compared to 196,810 acres in 1972. In addition to the acreage classified as defoliated only, another 17,270 acres were classified as dead in 1973.

Most of the devastation occurred in the Blue Mountains of northeast Oregon and southeast Washington where 629,500 acres were either defoliated or killed. On the Colville Indian Reservation in Washington, 36,170 acres received light to heavy defoliation. Defoliation also occurred on 23,450 acres of State and private lands in northeast and central Washington. A total of 160 acres were damaged on the Colville National Forest and 480 acres on the Wenatchee National Forest were defoliated. Biological evaluations and surveys were completed in late winter. Results of these evaluations indicate there are areas where the tussock moth will continue to defoliate and kill trees in 1974.

An environmental statement was prepared and filed with the Council on Environmental Quality on March 29, 1974. It was determined that chemical control was necessary on 408,000 acres to prevent further top-kill and tree mortality. Since there is no other suitable insecticide for large-scale forest land aerial application available, DDT was recommended. Because DDT is no longer registered for use, the U.S. Department of Agriculture requested an exemption under the Federal Insecticide, Fungicide, and Rodenticide Act as amended to control the tussock moth during 1974. This request was granted by the Environmental Protection Agency on February 28, 1974.

A total of 74,000 acres of the infested area have also been set aside to test *Bacillus thuringiensis*, natural virus, and several chemical insecticides in 1974.

Defoliator monitoring plots showed that the high populations of tussock moth larvae common over eastern Oregon and Washington last year are not occurring this year. The Klamath Ranger District, Winema National Forest, was the only area outside the general zones of infestation to show higher than normal populations.

In trying to find an effective insecticide to replace DDT, four insecticides, Zectran, Dylox, Sevin 4-Oil, and Bioethanomethrin were field tested during 1973 against the Douglas-fir tussock moth on plots 400 to 500 acres in size. When the request for emergency use of DDT in 1973 was denied, the Zectran test was expanded considerably, mostly on private lands in Oregon and on the Walla Walla watershed in Washington. This chemical had shown promise in previous tests and no other alternatives were available. About 70,000 acres were treated during June and early July 1973 with a double application of Zectran.

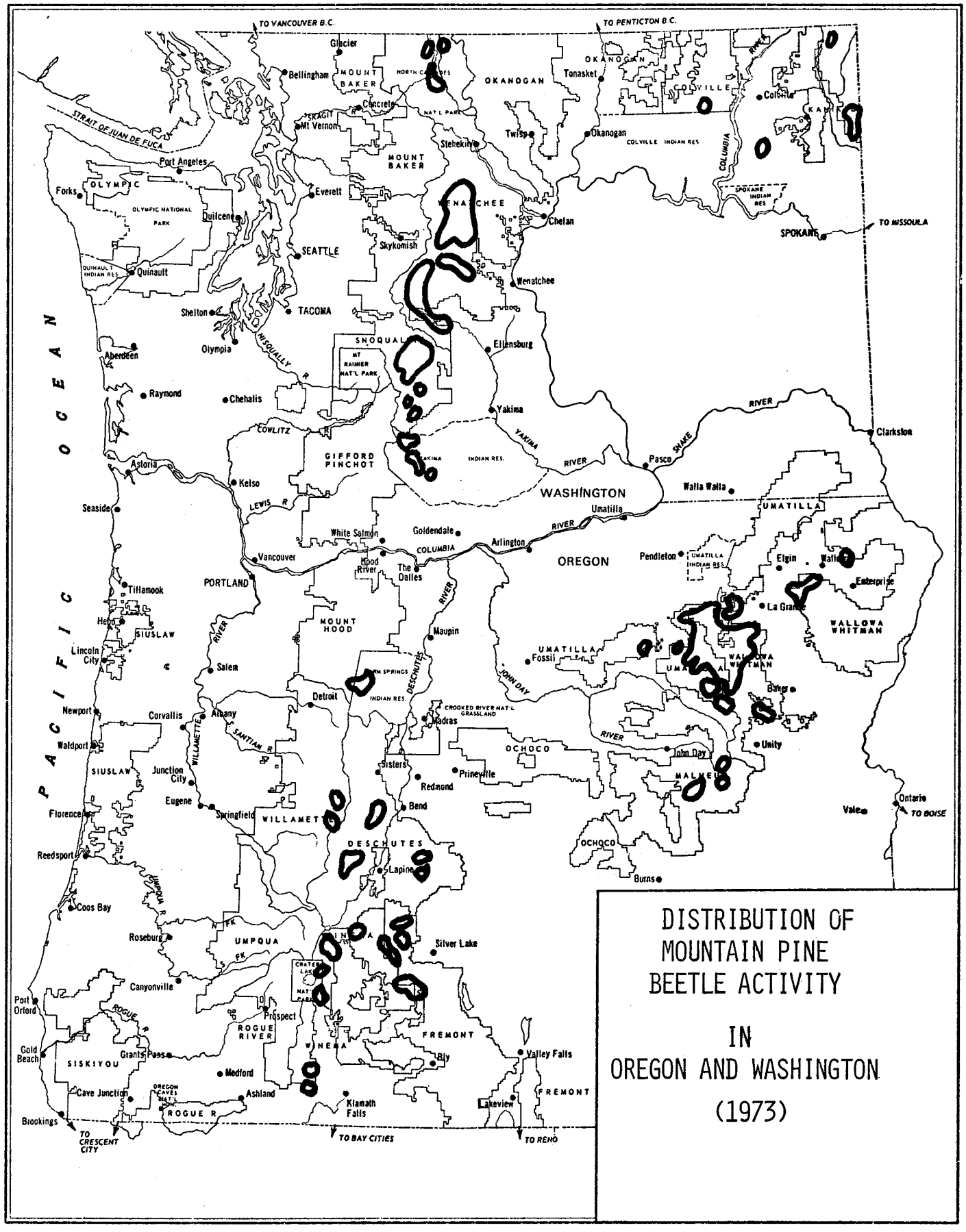
Results of the insecticide tests in Oregon and Washington show that all the chemicals killed considerable numbers of tussock moth larvae, but none reduced the population sufficiently to prevent severe defoliation and tree mortality.

The Pacific Northwest Forest and Range Experiment Station tested formulations of two microbial agents, a nuclear polyhedrosis virus and the bacterium, *Bacillus thuringiensis*. The treatments were applied by helicopter to several 20-acre plots.

Results of these tests indicate both the virus and Bacillus hold good potential as a control for the tussock moth. These two microbials were highly effective in reducing larval numbers. Foliage loss was greatly reduced on sprayed as compared to unsprayed plots.

WESTERN SPRUCE BUDWORM, *Choristoneura occidentalis* Free.

Infestations of the western spruce budworm continued to increase throughout Oregon and Washington (see Map on Page 9). In Washington, an increase in defoliated acres was evident while at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SNAKE
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Astoria
Kelso
WASHINGTON
Walla Walla
Seaside
LEWIS R
Umatilla
UMATILLA
White Salmon
Goldendale
RIVER
Arlington
Vancouver
COLUMBIA
Hood River
The Dalles
OREGON
Pendleton
UMATILLA INDIAN RES.
Elgin
Enterprise
Tillamook
PORTLAND
La Grande
Nehalem
SIUSLAW
RIVER
MOUNT HOOD
Maupin
WALLOWA WHITMAN
Lincoln City
UMATILLA
Fossil
Salem
DESCHUTES
JOHN DAY
Newport
Detroit
INDIAN RES.
Baker
Corvallis
Albany
CROOKED RIVER NAT'L GRASSLAND
Madras
WILLAMETTE
SANTIAM R
Waldport
OCHOCO
RIVER
John Day
Unity
SIUSLAW
Sisters
Junction City
Prineville
MALHEUR
Redmond
Eugene
Ontario
Florence
Springfield
Bend
TO BOISE
Vale
WILLAMETTE
DESCHUTES
OCHOCO
Reedsport
Lapine
Burns
UMPQUA R
Coos Bay
Roseburg
UMPQUA
Silver Lake
CRATER LAKE NAT'L PARK
Canyonville
Port Orford
ROGUE R
Prospect
ROGUE RIVER
FREMONT
WINEMA
Gold Beach
Grants Pass
SISKIYOU
Rly
Valley Falls
Medford
Cave Junction
OREGON CAVES NAT'L MONUMENT
Ashland
Klamath Falls
Lakeview
FREMONT
Brookings
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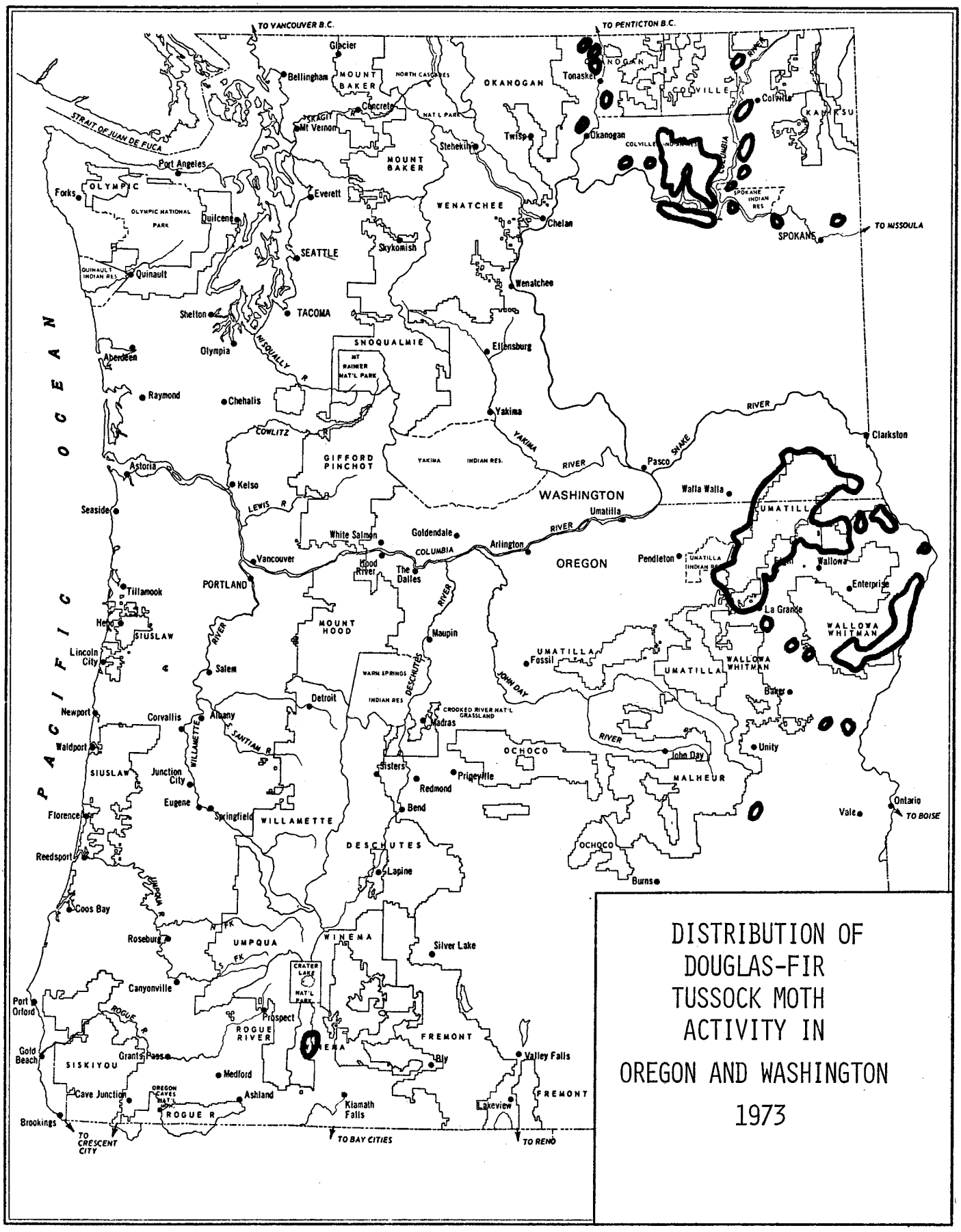
TO BAY CITIES
TO RENO
DISTRIBUTION OF MOUNTAIN PINE BEETLE ACTIVITY
IN
OREGON AND WASHINGTON
(1973)



DISTRIBUTION OF DOUGLAS-FIR TUSSOCK MOTH ACTIVITY IN OREGON AND WASHINGTON 1973

the same time there was a decrease in the intensity of defoliation. Top killing or tree mortality due to defoliation has not yet become a serious or widespread problem. If the current level of defoliation continues, it is estimated that these stands can sustain 2 or 3 more years of feeding before significant top killing will occur. Defoliation visible from the air has occurred on 282,130 acres on the Wenatchee and Okanogan National Forests and the North Cascades National Park. In Oregon, defoliation has been limited to 48,210 acres on the Wallowa-Whitman National Forest in northeastern Oregon. The current level of defoliation has not resulted in serious tree damage.

Fall egg surveys indicate infestations will continue in all areas. New or additional areas of defoliation were not determined. However, defoliator monitoring plots, examined in late June, revealed higher than normal populations over most of eastern Oregon and Washington. Most noticeably high populations, outside of the defoliated areas, were over the entire east slopes of the Cascade Mountains in Washington and the Burns and Prairie City Ranger Districts of the Malheur National Forest in Oregon.

MODOC BUDWORM, *Choristoneura viridis* Free.

Populations of this insect increased in white fir stands in the Warner Mountains on the Fremont National Forest. Light defoliation was observed on 20,840 acres. This outbreak is the northern extension of a more serious outbreak on the Modoc National Forest in California. Evaluation surveys in California revealed a serious problem exists for 1974, while surveys in Oregon indicate the outbreak will continue at about the same level as in the past and is not expected to cause any serious problems next year.

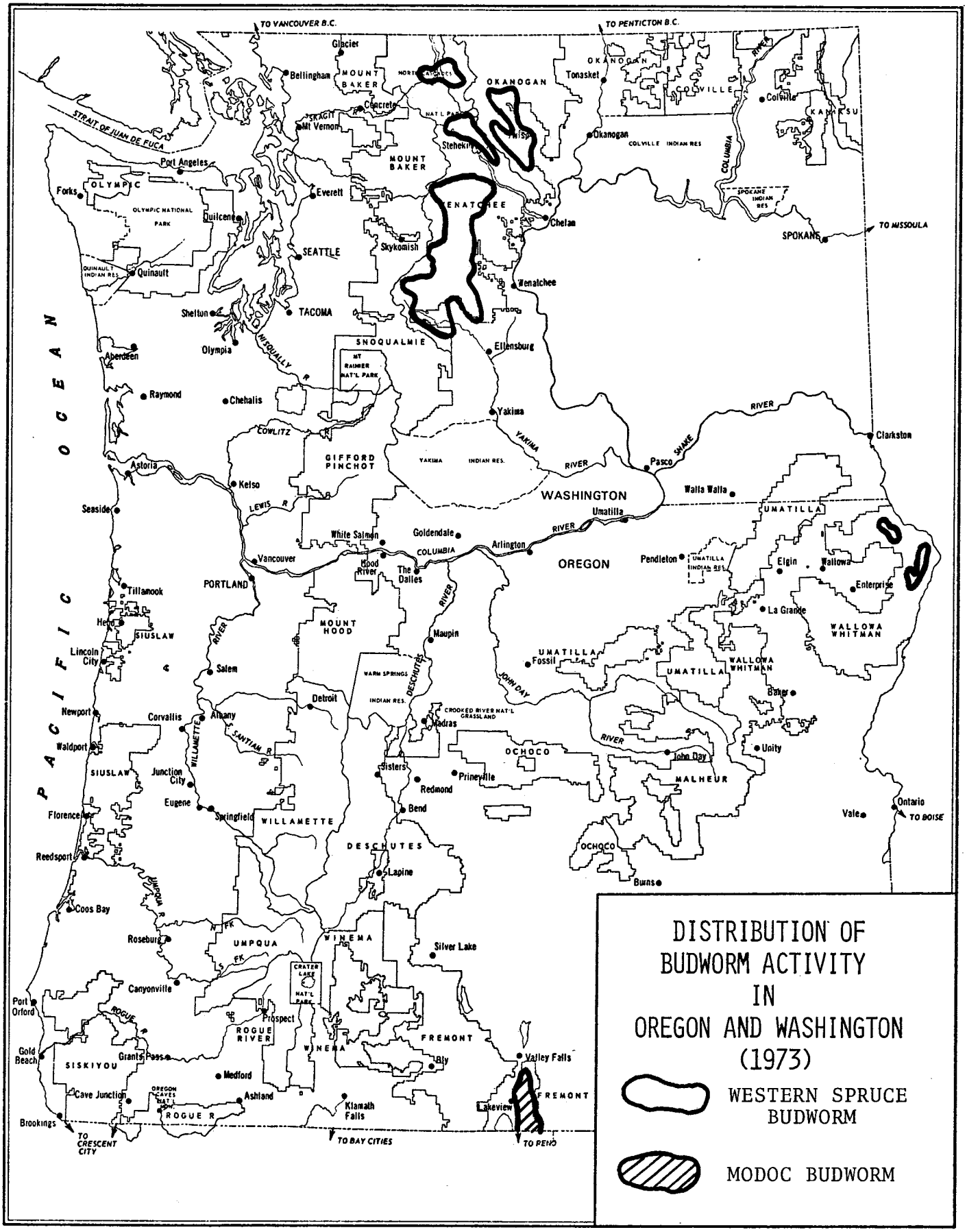
WESTERN BLACK-HEADED BUDWORM, *Acleris gloverana* Wishm.

Caterpillars of the western black-headed budworm continued to cause light defoliation of western hemlock at widely scattered localities in western Washington. Visible defoliation occurred on the Olympic and Mt. Baker National Forests and the Olympic National Park. The defoliation is not causing serious tree damage at the present time.

Table 3.—Summary of 1973 infestations for all defoliators, sucking insects, and pine engraver in Oregon and Washington.

Insect	National Forest lands[1]	Forest lands other than National Forest[2]	Dedicated forest lands (Wild. Areas & National Parks)[3]	All forest lands
	Area Acres	*Area Acres*	*Area Acres*	*Area Acres*
Oregon:				
Sawflies on knobcone pine	1,220	340	0	1,560
Sawflies on western larch	0	1,220	0	1,220
Western spruce budworm	45,400	2,810	0	48,210
Modoc budworm	16,810	4,030	0	20,840
Douglas-fir tussock moth	288,040	135,530	0	423,570
Balsam woolly aphid	64,360	9,510	33,750	107,620
Pine engraver	7,100	9,280	0	16,380
Oregon total	422,930	162,720	33,750	619,400
Washington:				
Western spruce budworm	202,440	56,640	23,050	282,130
Douglas-fir tussock moth	164,380	84,380	0	248,760
Black-headed budworm	87,480	0	10,110	97,590
Balsam woolly aphid	8,480	2,000	300	10,780
Pine engraver	0	190	0	190
Washington total	462,780	143,210	33,460	639,450
Regional total	885,710	305,930	67,210	1,258,850

[1] Excluding Wilderness areas.
[2] Includes all forested lands not within the boundaries of National Forests or National Parks.
[3] Includes only Wilderness areas of the National Forest system and National Parks.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SKAGIT
OKANOGAN
Tonasket
COLVILLE
Colville
KAMIAKEN
Okanogan
COLVILLE INDIAN RES
COLUMBIA RIVER
Stehekin
Twisp
Port Angeles
OLYMPIC
Forks
OLYMPIC NATIONAL PARK
Everett
Quilcene
CHELAN
Chelan
SPOKANE INDIAN RES
SPOKANE
TO MISSOULA
SEATTLE
Skykomish
QUINAULT INDIAN RES
Quinault
Wenatchee
Shelton
TACOMA
PUGET SOUND
NISQUALLY R
Olympia
SNOQUALMIE
Ellensburg
Aberdeen
MT RAINIER NAT'L PARK
Raymond
Chehalis
Yakima
COWLITZ R
YAKIMA RIVER
SNAKE RIVER
Clarkston
Astoria
GIFFORD PINCHOT
YAKIMA INDIAN RES.
Pasco
Kelso
WASHINGTON
Walla Walla
Seaside
LEWIS R
Umatilla
UMATILLA
White Salmon
Goldendale
Arlington
COLUMBIA RIVER
Vancouver
Hood River
The Dalles
OREGON
Pendleton
UMATILLA INDIAN RES
Elgin
Wallowa
Enterprise
PORTLAND
Tillamook
Maupin
La Grande
WALLOWA WHITMAN
Lincoln City
SIUSLAW
MOUNT HOOD
DESCHUTES RIVER
UMATILLA
Fossil
WALLOWA WHITMAN
Salem
WARM SPRINGS INDIAN RES.
JOHN DAY RIVER
Baker
Detroit
Newport
Corvallis
Albany
CROOKED RIVER NAT'L GRASSLAND
Madras
Waldport
SANTIAM R
WILLAMETTE
OCHOCO
John Day
Unity
SIUSLAW
Junction City
Sisters
Prineville
MALHEUR
Eugene
Redmond
Florence
Springfield
WILLAMETTE
Bend
Vale
Ontario
TO BOISE
DESCHUTES
Reedsport
Lapine
UMPQUA R
Coos Bay
N FK
UMPQUA
WINEMA
Silver Lake
Roseburg
S FK
CRATER LAKE NAT'L PARK
Canyonville
Burns
Port Orford
ROGUE
Prospect
ROGUE RIVER
FREMONT
WINEMA
Gold Beach
Grants Pass
SISKIYOU
Rly
Valley Falls
Medford
Cave Junction
OREGON CAVES NAT'L MNMT
Ashland
Klamath Falls
FREMONT
Lakeview
ROGUE R
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DISTRIBUTION OF
BUDWORM ACTIVITY
IN
OREGON AND WASHINGTON
(1973)
WESTERN SPRUCE
BUDWORM
MODOC BUDWORM

BALSAM WOOLLY APHID, *Adelges piceae* (Ratz.)

Aphid infestations continued to cause damage in true fir stands of western Oregon and Washington. Most outbreaks occurred on the Willamette, Mt. Hood and Deschutes National Forests in Oregon and the Gifford Pinchot and Snoqualmie National Forests in Washington.

LARCH CASEBEARER, *Coleophora laricella* Hbn.

Spread of this insect has continued in western larch stands throughout eastern Washington and northeast Oregon (see Map 11). The insect has not been found in the Cascade Mountains of Oregon and Washington or in the Ochoco Mountains of central Oregon. In the continuing attempts to establish a biological control, three species of parasites have now been introduced. *Agathis pumila* (Ratz.) has been released at many localities throughout the infestation. *Dicladocerus westwoodii* West. has been released in southeast Washington and northeast Oregon. *Chrysocharis laricinellae* (Ratz.) has been released on the Colville Indian Reservation in northeast Washington.

PINE ENGRAVER, *Ips pini* Say.

Most damage caused by this bark beetle occurred as scattered, small patches throughout southern and eastern Oregon. Damage was at a low level and about the same as last year.

SILVER FIR BEETLES, *Pseudohylesinus* spp.

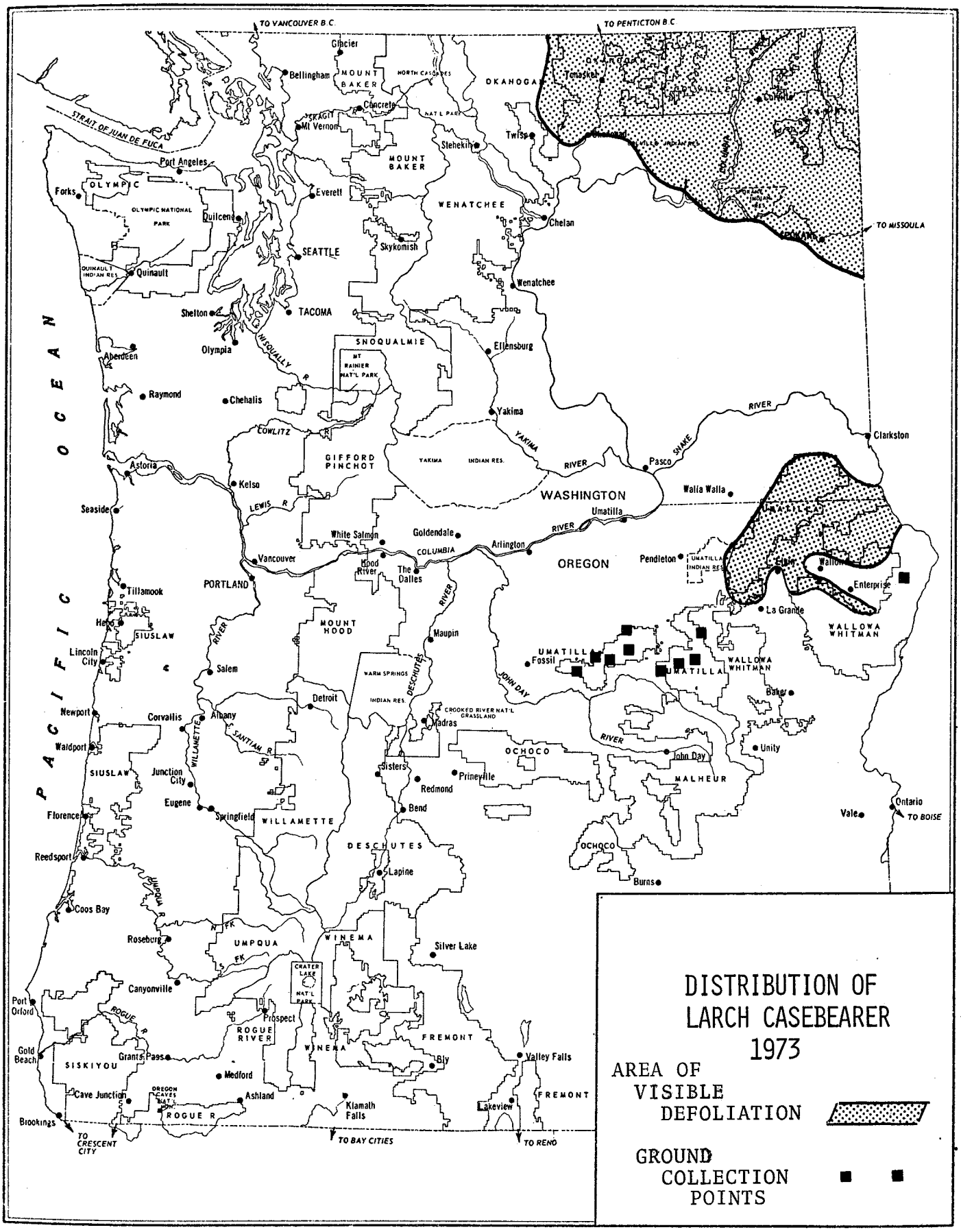
Minor killing of Pacific silver fir occurred on the west slopes of the northern Cascades and in the Olympic Mountains of Washington.

LARCH SAWFLY, *Pristiphora erichsonii* (Wong and Ross.)

This insect caused light defoliation of 1,200 acres of western larch on the Warm Springs Indian Reservation in Oregon. The larch sawfly has never been a serious problem in Oregon and Washington.

SAWFLIES, *Neodiprion* spp.

These sawfiies caused light defoliation of knobcone pine on the Rogue River and Siskiyou National Forests in southwest Oregon. This infestation has been occurring for several years but has not caused serious tree damage.



DISTRIBUTION OF LARCH CASEBEARER 1973

AREA OF VISIBLE DEFOLIATION

GROUND COLLECTION POINTS

STATUS OF DISEASES

RHIZINA ROOT ROT, *Rhizina undulata* Fr.

This root rot disease was reported to be killing conifer seedlings planted on recently burned clearcuts. In 1973, 278 recently burned clearcuts covering more than 12,500 acres were examined by the Washington State Department of Natural Resources, Oregon State Department of Forestry, and the U.S. Forest Service for the presence of *Rhizina undulata* (see attached map). Rhizina ascocarps were detected on 65 of the clearcuts. Less than 0.5 percent of the trees on units where Rhizina ascocarps were found were killed by the root rot. This disease is not considered to be of Regional importance in Oregon and Washington at this time. The results of this study have been summarized in a Pacific Northwest Region report.[1]

PORT-ORFORD-CEDAR ROOT ROT, *Phytophthora lateralis* Tucker and J. Milb.

From the time the fungus was introduced into the Pacific Northwest in the 1920's until the present, it has virtually destroyed most Port-Orford-cedar ornamentals and nurseries in western Washington and the Willamette Valley of Oregon. In 1952, the fungus was detected in the native stands near Coos Bay, Oregon. Several million board feet of timber have been killed by the disease.

A tentative program for protecting the remaining Port-Orford-cedar stands has been developed by Dr. Lewis Roth of Oregon State University. The program calls for identifying cedar production sites, creation of protection areas, dry season harvesting, regulation of mechanical travel, the use of clean equipment, and helicopters for logging. With present Port-Orford-cedar selling for as much as $1,600/M bd. ft., there is widespread interest in implementing the proposal.

ANNOSUS ROOT ROT, *Fomes annosus* (Fr.) Karst.

Eastern Oregon and Washington — Annosus root rot was identified as the cause of mortality in two ponderosa pine plantations on the Fremont National Forest. In both plantations, the root rot spread from large stumps created during commercial sale operations. Small stumps created by precommercial thinnings did not serve as infection courts.

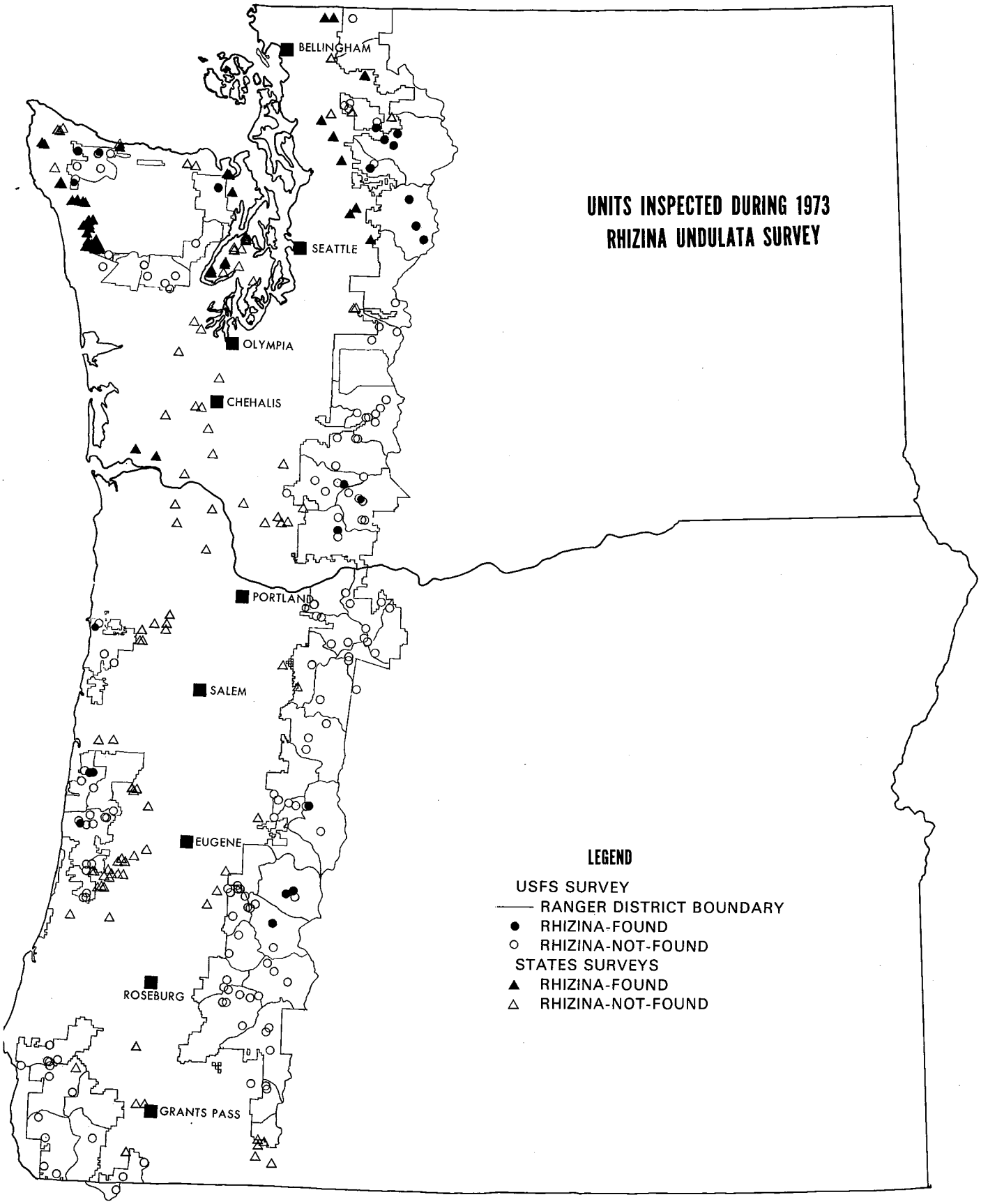
Annosus root rot is found infrequently in east side conditions in spite of many years of thinning and partial cutting. It is not considered to be a serious problem at this time.

A report prepared by the Washington State Department of Natural Resources and the University of Washington listed the following conclusions:[2]

1. Stump infection by *Fomes annosus* occurred in eastern Washington but the infection was low, rarely infecting more than 15 percent of the stumps sampled.
2. Moisture availability appeared as the strongest factor related to frequency of infection. The more annual rainfall the greater the frequency of infection.
3. Temperature, both maximum and minimum as recorded in the survey, did not appear to influence frequency of infection.
4. Severe winters reduced infection levels.
5. Ponderosa pine stumps may be susceptible to infection for periods as long as 3 to 4 months.

[1] Thies, W. G. 1973. *Rhizina undulata* impact evaluation. Pacific Northwest Region, Branch of Insect and Disease Control. Portland, Oregon (Unpublished report). 26 pp.

[2] Russell, K. W., R. E. Wood, and C. H. Driver. 1973. *Fomes annosus* Survey in Eastern Washington. Unpublished report presented at the Fourth International Conference on *Fomes annosus* held at Athens, Ga., Sept. 1973. 17 pp.


UNITS INSPECTED DURING 1973
RHIZINA UNDULATA SURVEY
BELLINGHAM
SEATTLE
OLYMPIA
CHEHALIS
PORTLAND
SALEM
EUGENE
ROSEBURG
GRANTS PASS
LEGEND
USFS SURVEY
RANGER DISTRICT BOUNDARY
RHIZINA-FOUND
RHIZINA-NOT-FOUND
STATES SURVEYS
RHIZINA-FOUND
RHIZINA-NOT-FOUND

ARMILLARIA ROOT ROT, *Armillaria mellea* Vahl. ex. Fr.

Armillaria root rot is a common root disease problem in the forests of Oregon and Washington. Ordinarily the fungus attacks trees which are under stress. Mortality is usually confined to only a small number of trees. Occasionally *A. mellea* becomes very pathogenic, killing large numbers of trees on a large area. At least three such intensive disease sites have been located in Oregon and Washington. Infection sites detected on the Winema and Fremont National Forests cover more than 1,000 acres. A similar disease site has been detected near Glenwood, Washington, on lands owned by the St. Regis Paper Company. Species killed on the Winema National Forest site included ponderosa pine, lodgepole pine, western white pine, incense cedar, and white fir.

At the Glenwood site, Oregon State University is conducting research studies on rate of spread and control measures.

WINTER DRYING

The winter of 1972-1973 caused the most severe winter damage since 1955. Below average snowfall accompanied by cold temperatures and drying wind during December and January produced spectacular damage on thousands of acres in the Pacific Northwest.

Damage was most evident in the Puget Sound and Columbia River lowlands and madrone stands in southwestern Oregon. Injury was observed on Douglas-fir, western hemlock, ceanothus, madrone, ornamental pines, and off-site species. Exposed trees were most severely injured but many recovered during the 1973 growing season. Some Douglas-fir and madrone on exposed sites were killed.

A related form of damage was observed on many high elevation sites. The tops of small trees not fully covered by snow were killed in several plantations. Approximately 15 to 20 percent of the Douglas-fir in a plantation on the Gifford Pinchot National Forest suffered top-kill. Similar losses were observed in other stands in Washington.

NEEDLE CASTS OF SCOTCH PINE, *Lophodermium* spp.

As many as four different species of *Lophodermium* have been found on the foliage of Scotch pine being raised for Christmas trees in Washington and Oregon. If not controlled, these fungi render the trees unmerchantable.

Fungicide trials conducted in 1972 and 1973 revealed that Dithane M-45 applied five times from June to September at the rate of 2 lbs. total material per 100 gallons of water with 4 ounces of spreader-sticker provided the most protection from the needle casts. Only 5 percent of the foliage treated at this rate was infected.

NURSERY DISEASES

Several beds of Douglas-fir seedlings in the Wind River Nursery, Carson, Washington, suffered losses from damping-off fungi. Most of the losses occurred before an application of Dexon was made.

Diseases of tree seedlings grown in containers under greenhouse conditions are becoming more important. Environmental conditions in the greenhouses are ideal for the rapid buildup of pathogenic organisms such as *Pythium, Fusarium,* and *Botrytis.* It is extremely difficult to raise a successful crop without periodic applications of fungicides. Approximately 10 million container-grown seedlings were produced in Oregon and Washington in 1973.

The effectiveness of seven fungicidal seed treatments for preventing seed and seedling losses was tested in 1973. Materials tested included:

Arasan 42-S
Arasan 75
Benlate WP
Captan 75
Dexon 35 WP
Chemagro CHE 1843 — Preseed

Dexon 35 WP applied at the rate of 2 oz. active ingredient per 100 lbs. of seed provided the best protection for ponderosa pine seeds. Arasan 75 applied at the rate of 35 oz. active ingredient per 100 lbs. of seed provided the best protection for Douglas-fir seeds.

The seed treatments were more effective in reducing "early" damping-off losses caused by *Pythium* spp. than "late" root rot losses caused by *Fusarium* spp. Fusarium root rot appeared approximately 3 weeks after the seedlings emerged.

The results of this study have been summarized in a Pacific Northwest Region report.[3]

WESTERN GALL RUST, *Endocronartium harknessii* (J. P. Moore) Y. Hiratsuka.

The rust has intensified on short pine, *Pinus contorta,* on the Dunes National Recreation Area on the Oregon coast within the last 5 years. Many small branches have been killed as a result of the galls. Trees established from local seed sources appear to possess a greater degree of resistance than those developing from nonlocal sources. A program is underway to collect seeds from resistant local seed sources. These seeds will be used to reforest portions of the area.

UNIDENTIFIED CANKER OF DOUGLAS-FIR

An unidentified canker was observed on approximately 32 percent of the Douglas-firs examined in two 10- and 15-year-old plantations on the Mt. Baker National Forest in Washington. The canker has been observed in at least four other plantations.

The large sunken reddish cankers originate from galleries of *Laspeyresia* spp. cambium miners. Many cankered trees have also suffered from snow breakage.

Attempts to isolate and identify the causal organisms are continuing. Semipermanent plots have been established in infected stands to follow the progress of the disease.

DUTCH ELM DISEASE, *Ceratocystis ulmi* (Buism.) C. Mor.

Dutch elm disease has been detected in American elms in the communities of Ontario and Nyssa, Oregon.[4]

DOUGLAS-FIR BACTERIAL GALL, *Bacterium pseudotsugae* Hansen and R. Smith.

Galls caused by *Bacterium pseudotsugae* were detected on a small number of Douglas-fir seedlings in the Wind River Nursery. Approximately 50 percent of the suppressed trees on 200 acres in a stand on the Rogue River National Forest had galls.

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[3] Johnson, D. W. and R. D. Harvey, Jr. 1973. Evaluation of seed protectant fungicides for control of Douglas-fir and ponderosa pine seedling root rots. Pacific Northwest Region, Branch of Insect and Disease Control. Portland, Oregon. (Unpublished report). 12 pp.

[4] Partridge, A. D. and L. C. Weir. 1974. Dutch elm disease moves into Oregon from Idaho. Plant Disease Reporter 58(1): 75-76.

The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

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